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Melman

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(54) **APPARATUS AND METHOD FOR SEARCH AND RETRIEVAL OF DOCUMENTS**

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G06F 17/30 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 17/30395*** (2013.01); ***G06F 17/30011*** (2013.01); ***G06F 17/3064*** (2013.01); ***G06F 17/30554*** (2013.01); ***G06F 17/30696*** (2013.01); ***G06F 17/30864*** (2013.01); ***G06F 17/30867*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 17/30696
USPC 707/2, 721, 767, 727
See application file for complete search history.

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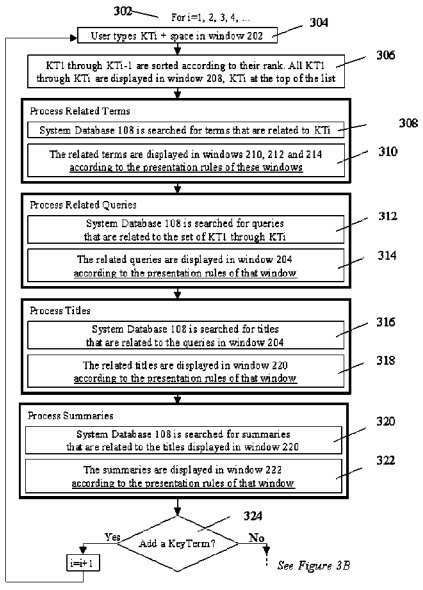
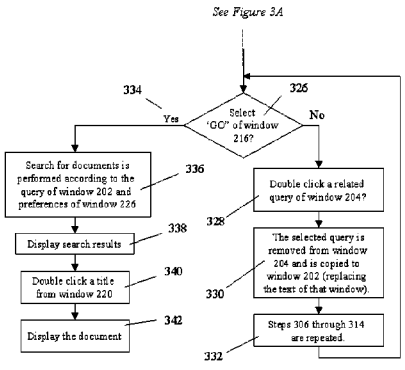
Primary Examiner — Brittany N Allen

(57) **ABSTRACT**

A system for the support and management of search for documents is presented. The system includes knowledge-database, query interface and communication to a database of documents to be searched. Information generated during a search session is collected by the system and is added to the knowledge-database. The information is ranked automatically according to the usage of that information by the user. During successive search session, or during search made by other users, the system uses the knowledge-database to support the users with keywords, queries and reference to documents.

38 Claims, 4 Drawing Sheets





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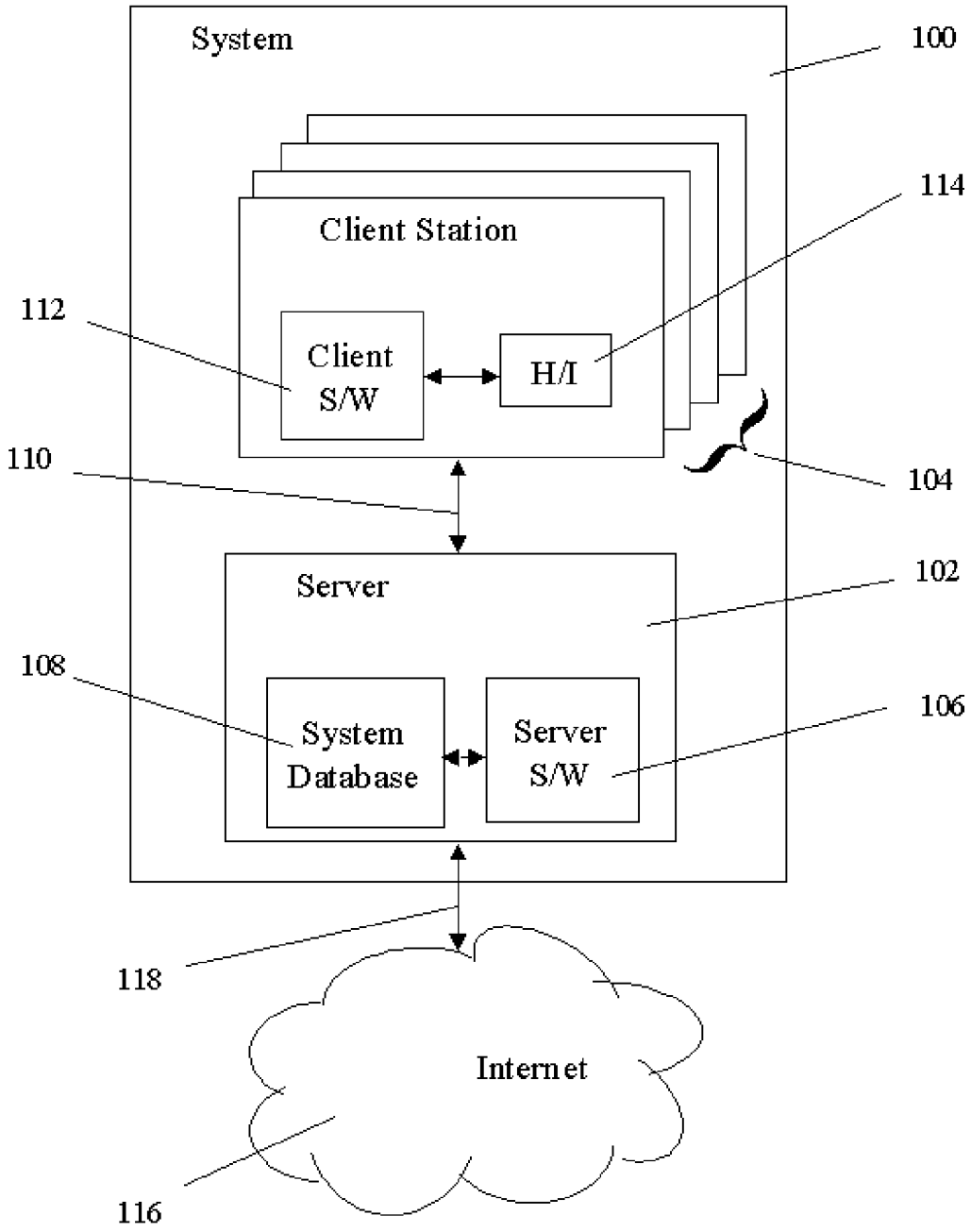
System
100
Client Station
114
112
Client S/W
H/I
110
104
Server
102
108
System Database
Server S/W
106
118
Internet
116

Figure 1

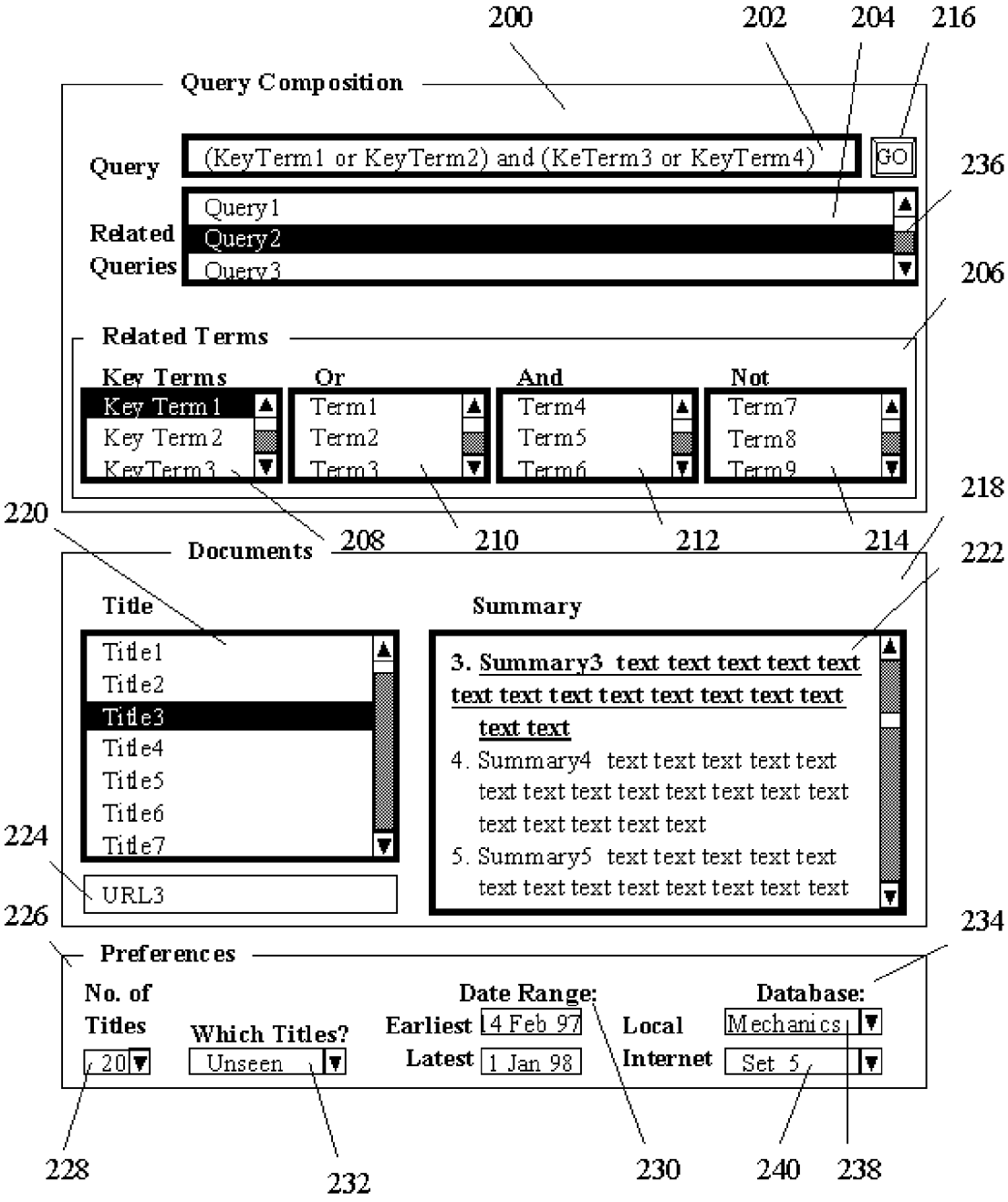
200
202
204
216
Query Composition
Query
(KeyTerm1 or KeyTerm2) and (KeTerm3 or KeyTerm4)
GO
236
Related Queries
Query1
Query2
Query3
206
Related Terms
Key Terms
Or
And
Not
Key Term1
Key Term2
KeyTerm3
Term1
Term2
Term3
Term4
Term5
Term6
Term7
Term8
Term9
218
220
208
210
212
214
Documents
222
Title
Summary
Title1
Title2
Title3
Title4
Title5
Title6
Title7
3. Summary3 text text text text text text text text text text text text text text text text text
4. Summary4 text text text text text text text text text text text text text text text text text text text text text
5. Summary5 text text text text text text text text text text text text text text text text text
224
URL3
226
234
Preferences
No. of Titles
20
Which Titles?
Unseen
Date Range:
Earliest
4 Feb 97
Latest
1 Jan 98
Local
Mechanics
Internet
Set 5
Database:
228
232
230
240
238

Figure 2

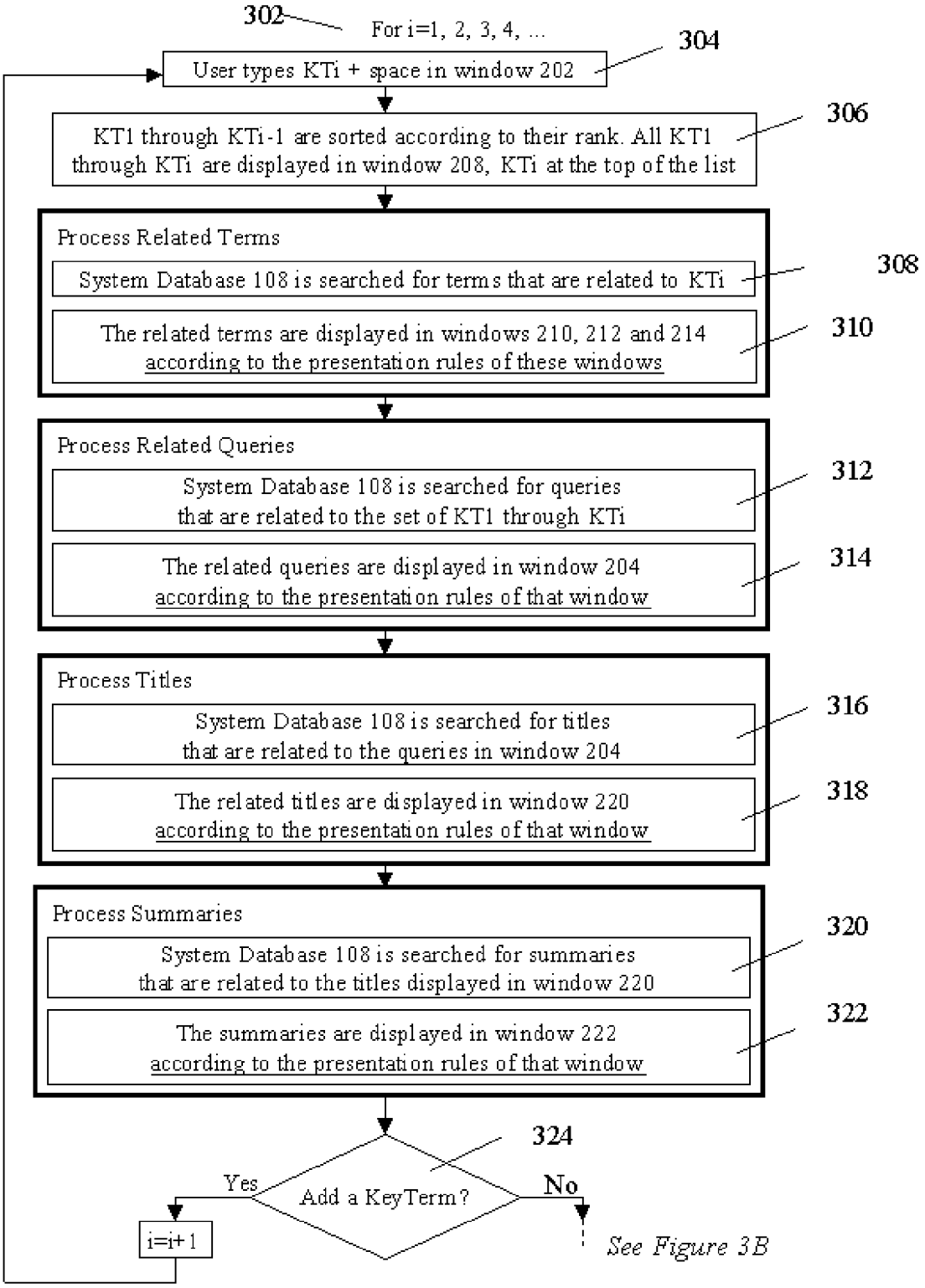
302
For i=1, 2, 3, 4, ...
304
User types KTi + space in window 202
306
KT1 through KTi-1 are sorted according to their rank. All KT1 through KTi are displayed in window 208, KTi at the top of the list
Process Related Terms
308
System Database 108 is searched for terms that are related to KTi
310
The related terms are displayed in windows 210, 212 and 214 according to the presentation rules of these windows
Process Related Queries
312
System Database 108 is searched for queries that are related to the set of KT1 through KTi
314
The related queries are displayed in window 204 according to the presentation rules of that window
Process Titles
316
System Database 108 is searched for titles that are related to the queries in window 204
318
The related titles are displayed in window 220 according to the presentation rules of that window
Process Summaries
320
System Database 108 is searched for summaries that are related to the titles displayed in window 220
322
The summaries are displayed in window 222 according to the presentation rules of that window
324
Add a KeyTerm?
Yes
No
i=i+1
See Figure 3B

Figure 3A

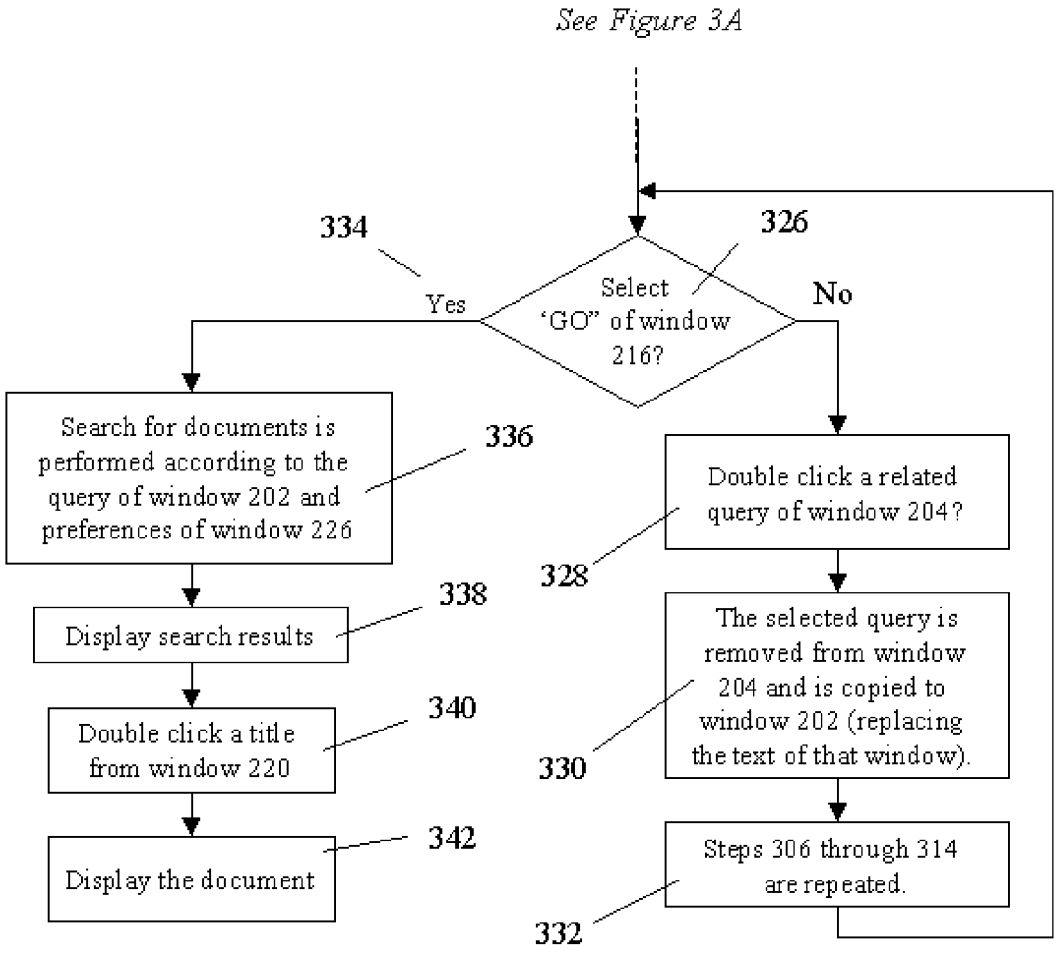
See Figure 3A
334
326
Yes
Select "GO" of window 216?
No
Search for documents is performed according to the query of window 202 and preferences of window 226
336
Double click a related query of window 204?
328
Display search results
338
The selected query is removed from window 204 and is copied to window 202 (replacing the text of that window).
330
Double click a title from window 220
340
Steps 306 through 314 are repeated.
Display the document
342
332

Figure 3B

APPARATUS AND METHOD FOR SEARCH AND RETRIEVAL OF DOCUMENTS

FIELD OF THE INVENTION

The invention is related to the field of digital information management and, in particular, to search and retrieval of the same.

BACKGROUND OF THE INVENTION

The growth of the Internet introduced broad access to information not available before. Access to digital information sources, once an asset of a small group of professional, holding information technology skills, has become a daily tool for millions of the Internet users.

Lower skill levels for search of such information is now an inseparable part of searches made for information by most of the users. Skill and knowledge aspects became limiting factors for successful search and retrieve of such information. Such limitations present themselves in the composition of Boolean queries, knowledge of relevant information sources such as the AltaVista index at www.altavista.digital.com (maximum coverage of Internet documents by a single index is less then 40%). Many of the documents are accessed only by a direct reference from a person with a specific knowledge. Many of the information provided by querying an index such as Yahoo are not relevant. The search process is long, queries are modified many times and many information pieces are missed.

Natural language query is one suggested replacement for Boolean query method. However, a research from Search Insider (www.searchinsider.com) indicates clearly that users prefer the Boolean query methods and that search engines such as AltaVista and Yahoo (www.yahoo.com) provide require much improvement.

The present status of information search and retrieval in the Internet is characterized by long and tedious search process, poor relevancy of retrieved documents and low level of success in retrieval of relevant documents.

It is the purpose of the present invention to provide a method and tools for efficient search and retrieval of documents. The description in reference to the Internet is maid in a way of example only. It would be appreciated by those skilled in the art, that the proposed method is applicable to any digital information source.

A SUMMARY OF THE INVENTION

In a preferred embodiment of the present invention, the system comprises a Server, Clients having a Human Interface (H/I) and communication with the server, a Database, a connection to the Internet and Software of that system. A User of the Client is using the H/I to compose a query view various information pieces including retrieved documents or titles or summary of those documents. The Software traces the user's search activity, collecting data such as queries and relevant or irrelevant documents and information sources. The data is evaluated and stored in the Database.

The data is also compared to other data, collected from all users, available from the Database. A data that is relevant to assist the current search process is presented to the user. This data include highly ranked queries that are similar to the query composed by the current user and highly ranked documents retrieved in the past by those queries.

As the Database is the accumulation of many such search processes, made by many users, in the same subject, the current user can benefit from the many hours invested by others to find information in this subject.

This method is particularly effective when used within an organization, whereas the organization members search for information that is relevant to the activity of that organization. Thus the Database generated overtime is highly relevant to all members of such organization.

The invention will be better understood in reference to the following Figures:

FIG. **1**. A general block diagram of a preferred embodiment of the system of the present invention.

FIG. **2**. A description of a preferred embodiment of a Human Interface of the present invention.

FIG. **3**A and FIG. **3**B (referred to as FIG. **3**). A workflow chart, describing a preferred process of working with the system of the present invention.

A DETAILED DESCRIPTION OF THE INVENTION

Reference is made now to FIG. **1**, which is a general description of one preferred embodiment of the system, presented in the form of a block diagram. A preferred embodiment of the invention is presented. System **100** for search and retrieval of documents includes:

1. Server **102** which is any suitable computer such as IBM Netfinity 3000, available from IBM Corporation, North Carolina, U.S.A. with a suitable server software (Server S/W **106**) such as Microsoft Windows NT, available from Microsoft Corporation, Washington, U.S.A.

2. At least one Client Station **104** which is any personal computer such as IBM PC 300XL with suitable software (Client S/W **112**) such as Microsoft Windows NT (the drawing illustrates multiple Client Stations **104**).

3. Server **102** includes also System Database **108**.

4. Each of Client Stations **104** is connected to the Server by any means of communication **110** (such as LAN) and any standard communication protocol (such as TCP/IP).

5. Each of the Client Stations contains also Human Interface **114**, such as described in details in reference to FIG. **2**.

6. System **100** is also connected to at least one source of digital information **116** by communication means **118**. In the preferred embodiment presented here, such a source of digital information is the Internet. This connection may be done using any method, some of the methods are described in "Using the Internet", 2nd edition by Mary Ann Pike, ©1995.

Initial Search Process:

Initial search is characterized by no data in System Database **108**. At this stage System **100** can not assist the user to find the information he is looking for. In this stage System **100** traces the user's search session, collects data from the search session, processes the data and stores the results in the database.

In the present embodiment of the invention, the user composes a Boolean query using Human Interface **114**. The user then submits the query to a search engine such as AltaVista. A set of titles and summaries in presented to the user by the search engine.

The user may now select some of the titles for a detailed review and ignore the others.

When the detailed document is presented to the user it is desired that the evaluation of the document, by the user, will be provided to the System. For that purpose a window is displayed with the document. The window contains a dual button interface indicating Y and N. To change from the document display back to the search session the user must click either the Y or the N. Y indicates that the document is

relevant to the user and N indicates irrelevant document. System **100** also traces activities such as printing a document or saving a document on disk. These actions are considered as parts of positive evaluations of a document.

The user, repetitively composes improved queries, submits them to the search engine and evaluates results (direct or indirect evaluation). During the search session the user may submit queries to different sources such as AltaVista, Yahoo and Lycos (www.lycos.com). Also meta-search engines such as MetaCrawler (www.metacrawler.com) may be used.

When the user finishes the search session, the system has collected raw data ready for process. This data includes details such as the following:

1. Queries submitted by the user.
2. URLs of documents (URL: Uniform Resource Locator)
3. One query to many URLs relations for the URLs retrieved by each one of the submitted queries.
4. A set of evaluation parameters for each URL:

Y, N

Review of detailed document

Document printed

Document saved on storage device

Documents summaries—those that are available

Document generation date, last update date

5. Date and time session ended.
6. Register indications of who, within the users group, reviewed the document.
7. Date URL introduced to System Database.

A process of the data is begun at this stage to produce a set of valuable information in the System Database, the information contains details such as:

1. Ranking each of the URLs as per the following example:

A new URL (not exists in the System Database) acquires a preliminary rank 1.

Add 10 points for 'Y'.

Add 3 points for review of the document.

Add 1 point for printing the document,

Add 1 point for storing the document on a storage device.

Subtract 1 point for 'N'.

This ranking method enables increase of URL ranking either by direct or indirect evaluation by the user. Also, Rank reduction effectiveness is limited to avoid unintentional negative ranking of a URL.

2. A ranking method for a query is provided hereinbelow as an example: Generate ranking parameters for each submitted query:

Number of URLs related to this query that are ranked over 0 (n_1).

The sum of ranks of these URLs (v_1).

Number of URLs related to this query that are ranked 0 (n_2).

Number of URLs related to this query that are ranked lower then 0 (n_3).

The sum of ranks of these URLs (v_3).

Number of terms in the query (T_1).

'Term' is used here in the broad sense. For example, a 'term' may be a single word, expression containing more then one word and a sequence of characters with indication to refer to all words and expressions containing that sequence of characters.

A query may then be ranked using a formula such as:

$$\text{Rank}=K_1\times(v_1/n_1)+K_2\times(v_3/n_3)+K_3\times T_1 \quad (1)$$

This formula may use a relatively high value for K_1 to make valuable URLs more effective in ranking the query as a useful query. K_2 may be a relatively low value to limit the effect of irrelevant URLs retrieved by this query. This satisfies the need to reduce the rank of a query if many irrelevant URLs are retrieved by the query but, at the same time, make sure that the query maintains a good rank if it also retrieves valuable URLs.

T_1 is an indication for the sophistication of the query that adds to the value of such query to the user.

It would be appreciated that ranking formula (1) is an example and many other formulas may produce valuable solution.

3. Generating a set of related terms: each query is analyzed for terms related by Boolean operators such as OR, AND and NOT. This generates a many to many relations among terms of the query.

Consider the following query example:

(car or automobile or vehicle not bus) and (road or sand or mud).

The following relation table may be generated:

	car	automobile	vehicle	bus	road	sand	mud
car	—	OR	OR	NOT	AND	AND	AND
automobile	OR	—	OR	NOT	AND	AND	AND
vehicle	OR	OR	—	NOT	AND	AND	AND
bus	NOT	NOT	NOT	—	NOT	NOT	NOT
road	AND	AND	AND	NOT	—	OR	OR
sand	AND	AND	AND	NOT	OR	—	OR
mud	AND	AND	AND	NOT	OR	OR	—

This vocabulary, with the Boolean relations, is useful in identifying terms that are relevant to other terms, in the sense of composing a Boolean query. For example, when the word 'vehicle' is introduced in a query, the System may use the System Database to present the user with other terms that may be useful, under the relevant category:

OR: car, automobile

AND: road, sand, mud

NOT: bus

The user may then use these related terms to enhance his query.

4. Ranking each of the terms. The terms may be ranked according to the number of times they appear, in relation to a given term, in all queries. The ranking may be separate for each type of Boolean relation, such as OR, AND and NOT.

This ranking may also be modified, by weighting each appearance by the rank of the query, that generates said relation.

This will enable to present the terms, such as 'road', 'sand' and 'mud' in appropriate order: most useful term at the top.

It would be appreciated that a regular thesaurus will not provide such relations nor contain many professional terms (such as densitometer and "SELFOC lens"). The method of this invention generates a database containing such terms, introduced by the users during multiple search sessions.

The data collected during the search session is then stored in the System Database together with the set of parameters and calculated ranks. This also includes submitted queries, URLs, summaries, terms and their relations and ranking.

The amount of such data accumulates more rapidly when the System is multi user. This is the case in organizations, where many members of the organization search for information regarding similar subjects.

Reference is made now to FIG. **2**, which demonstrates a preferred embodiment of Human Interface **114** of FIG. **1**.

In order to enable a comprehensive explanation, it is assumed that an amount of data has already been collected in

System Database **108** by the process described hereinabove and this data is available for assistance of searches made by individuals.

Query Composition Section:

In a preferred embodiment of the invention, Query Composition section **200** contains Query window **202** where the current query is composed and Related Queries window **204** for display of relevant queries stored in System Database **108**.

Basic query composition is done in Query window **202**, by typing words, expressions, Boolean operators and conventional singes. Following are some examples:

Words:	car, road, table, . . .
Expressions:	"racing car", "road map", "Tolman's coffee tables", . . .
Boolean operators:	OR, AND, NOT, ADJ, . . .
Indefinite termination:	info* stands for: (information OR inform OR Infocenter OR . . .)

Related queries are displayed in Related Queries window **204**. In a simple implementation of the present invention, terms from Query window **202** are used to search System Database for stored queries that contains such terms. The queries are displayed in Related Query window according to their rank, highest rank first.

In a more sophisticated implementation of the present invention, the queries containing terms of Query window **202** are specially ranked for display in Related Queries window **204**. This ranking may first rank the queries in accordance to the number of terms from Query window **202** that are contained in these queries and then, a sub-level sorting is performed, where all queries of the same ranking are sub-sorted by their own rank (as stored in System Database **108**). Other ranking schemes are possible.

In default, the top query of Related Query window **204** is highlighted. Any other query of window **204** can be highlighted by clicking on it. More then one query may be highlighted simultaneously. Double clicking a query of Query window **204** will copy the query to Query window **202**, instead of what was previously in that window. Related Query window **204** will refresh then, according to the new query in Query window **202**.

More queries may be observed in Related Queries window **204** by using Roll Slider **236**.

The method of clicking, double clicking, highlighting, window rolling with a roll slider and other such elements are in accordance to the conventions of Windows'95 from Microsoft Corporation, Seattle, Wash., U.S.A. It will be assumed that the reader is familiar with these conventions and they will not be described here in more details.

Related Terms Section:

Related Terms section **206** within Query Composition section **200** supports the process of query composition by listing terms that are related to the terms of the query in Query window **202**. Related Terms section **206** contains four windows:

1. Key Terms window **208** is used for controlling key terms. Such terms, indicated as KeyTerm**1**, KeyTerm**2** . . . (KT**1**, KT**2** . . .) are automatically selected from Query window **202**, excluding Boolean operators and Boolean syntax. The user may add, remove or select any terms of window **208**. In a simplified implementation of the present invention, the terms of window **208** are presented in the same order of appearance in the query of Query window **202**.

In another implementation of the invention, the terms are presented in accordance to their ranking-high ranking first.

Other sorting methods for display order are possible.

In default, the first term of Related Terms window **208** is highlighted. The user may highlight any other term. Terms may be added, edited and removed from window **208**.

2. 'Or' window **210** contains terms that we are related to the terms of Key Terms window **208**. The relation is established by the Boolean operator 'OR' in queries composed and stored in System Database **108** in previous search sessions. For example 'Term**1**' in window **210** appears in at least one query stored in System Database **108**,

either in the form
...KeyTerm1 OR Term1...
or in the form
...KeyTerm2 OR Term1...

The order of the terms presented in window **210** may be according to the following sorting:

First: terms that are related to the highlighted term of window **208**.

Then: terms are sorted according to their ranking (described hereinabove).

Then: terms that are related to non highlighted terms of window **208**, arranged in groups of the same order as the ranking of the non highlighted terms of window **208**.

Then: each of the group of terms relating to a non highlighted term of window **208** is sub-sorted according to their own ranking.

3. 'And' window **212** contains terms that we are related to the terms of Key Terms window **208**. The relation is established by the Boolean operator 'AND' in queries composed and stored in System Database **108** in previous search sessions. For example 'Term**4**' in window **212** appears in at least one query stored in System Database **108**,

either in the form
...KeyTerm1 AND Term4...
or in the form
...KeyTerm2 AND Term4...

Order of display is according to the method of window **210**.

4. 'Not' window **214** contains terms that we are related to the terms of Key Terms window **208**. The relation is established by the Boolean operator 'NOT' in queries composed and stored in System Database **108** in previous search sessions. For example 'Term**7**' in window **214** appears in at least one query stored in System Database **108**,

either in the form
...KeyTerm1 NOT Term7...
or in the form
...KeyTerm2 NOT Term7...

Order of display is according to the method of window **210**.

Nested Boolean relations are supported. For example, query of the type

(A OR B) AND (C OR D) NOT (E OR F)

will generate the following relations:

Key Term	Or	And	Not
A	B	C	E
		D	F
B	A	C	E
		D	F
C	D	A	E
		B	F
D	C	A	E
		B	F
E	F		A
			B
			C
			D
F	E		A
			B
			C
			D

Button 'Go', **216**, is used to indicate that the composition of the query is complete and the system is to retrieve information in accordance to that query.

Documents Section:

Document section **218** is used to display titles and summaries of documents in accordance to the highlighted Query in Related Queries section **204**.

Title Window:

The titles of the documents are displayed in Title window **220** are titles that are highly related to the highlighted query of window **204**, Query**2** in the example of FIG. **2**.

The titles are available from System Database **108** and are displayed in order according to their ranking. High rank displayed first.

If the number of such titles is lower then No. of Titles **228** (20 in the example of FIG. **2**), the next group of titles is extracted from System Database **108**. These titles are related to the non-highlighted title with the highest rank in window **208**. If this does not provide the required number of titles, the next group of titles is extracted from System Database **108**. These titles are related to the non-highlighted title with the second highest rank in window **208**. This procedure is repeated until the required number of titles is provided.

Each such group of titles is sub-sorted according to the rank of the titles.

Titles are also filtered for display by Which Title? window **232**. In the example of FIG. **2**, only New titles are presented. These are titles that have not been reviewed yet by the present user. The filtering action of the preferences is explained in more details hereinbelow, in the Preference section part.

A single click on a title of window **220** will affect the display of summaries in Summary window **222** as explained hereinbelow.

A double click on a title of window **220** will display the document of that title. Window **224** is an indicative window that displays the URL of the highlighted title of Window **220**.

Summary Window:

The summaries of the documents that are displayed in Summary window **222** are related to the list of titles in window **220**. The summary of the highlighted title, Title**3** of window **220** in the example of FIG. **2**, is displayed in bold underlined characters, at the top of window **222**, indicated as Summary**3**. Unused area, below Summary**3**, is used for summaries of subsequent tiles, as provided by the size of window **222**. These summaries are presented in the same order as the titles of window **220**. The roll slider of this window allows both up-rolling for summaries preceding Summary**3** and down-rolling for summaries succeeding Summary**3**.

Double clicking a summary will display the document of that summary.

Preferences Section:

Preferences section **226** is used for input, by the user, of preferences for the search session. A maximum number of titles to be presented is indicated in window **228**, adjustable by the user. Date Range windows **230** indicate the earliest and latest dates of that range. Only documents that were updated in System Database **108** within this range will be presented. The dates are adjustable by the user. Which Title window **232** contains multi-choice options.

Three such options may be:

1. 'New': documents that the current user did not see before the present search session—documents that are new to the current user.
2. 'Reviewed': only documents that have been reviewed by the current user in a previous session. This is useful when the user is interested in a document he reviewed in the past but does not know the location of that document.
3. 'Any': displays both 'New' and 'Reviewed' documents.

Database windows **234** indicates the database to be used by the system.

Local window **238** is used to select the preferred local database to perform as System Database **108**. This may be one of few local databases or a portion of a database. The different options may be indicated by names such as:

Electronics: the portion of the database related to the electronic engineers.

Marketing: the portion of the database related to the marketing people.

All: All database.

This arrangement is described in more details in Israeli patent application number 119183 dated Sep. 2, 1996 (Haim Zvi Melman et al.).

The selected database is used during the user's interaction with the human interface of FIG. **2** including when a query is submitted for search (old or new query).

Internet window **240** is used to select the preferred Internet database sources. This is useful for submission of queries for search of new documents (or titles) that are not in the local database. Pre-configured selections of sources are available at this window.

Aided Search Session:

The aided search session will be described hereinbelow in reference to FIG. **2** and FIG. **3**.

For simplicity, all elements of FIG. **2** are indicated with the digit 2 for the hundreds digit, such as **202**, **206** and **214**.

All elements of FIG. **3** are indicated with the digit 3 for the hundreds digit such as **302**, **306** and **314**.

It will be appreciated that the system can handle multiple simultaneous search sessions, conducted by different users, independently. Each user may use his own preferences configuration in Preferences window **226**. The data collected from each user is added to System Database **108** to serve all users. Parts of System Database **108** may be limited for use by only few users, not accessible to others.

In this example, the preferences of window **226** will be as indicated in FIG. **2**:

No. of Titles:	20
Which Title:	New

-continued

Date Range	Earliest:	14 Feb 97
	Latest:	01 Jan 98
Source:	Local:	Mechanics
	Internet:	Set 5

1. The user types KeyTerm**1** (KT**1**) and space in window **202** (step **304** of FIG. **3**).
2. The space is interpreted by System **100** as a term separator.
3. KT**1** is the only term at this stage and it is the only term (Key Term**1**) displayed in Key Terms window **208** (step **306** of FIG. **3**).
4. System **100** is searching System Database **108** for stored terms that are related to KT**1** (step **308** of FIG. **3**).
5. The terms that are related to KT**1** are displayed in windows **210**, **212** and **214** according to the presentation rules of these windows (step **310** of FIG. **3**).
6. System **100** is searching System Database **108** for stored queries that contain KT**1** (step **312** of FIG. **3**).
7. The selected queries are displayed in window **204** according to the display rules of that window (step **314** of FIG. **3**). First query is highlighted by default. Another query can be highlighted by the user by a single click on the query.
8. In step **316** System Database **108** is searched for titles that are related to the queries of window **204**.
9. The related titles are displayed in window **220** according to the display rules of that window (step **318** of FIG. **3**).). First title is highlighted by default. Another title can be highlighted by the user by a single click on the title.
10. System **100** is searching System Database **108** for stored summaries associated with the titles of window **220** (step **320** of FIG. **3**).
11. The selected summaries are displayed in window **222** according to the display rules of that window (step **322** of FIG. **3**).
12. The user may now select to add a Key Term in window **202** either by typing in the term or by selecting a Term from any of windows **210**, **212** and **214** by double clicking a Term. If he double clicks a term from said window, the Term will be added to the term in window **202** together with its' Boolean operator: OR, AND or NOT, according to the window from which the term was selected. This term will be added as Key Term**2** (KT**2**) to window **202**.

    The user may introduce editorial changes to the content of window **202** such as changing the Key Terms or the Boolean operators.
13. System **100** repeats steps **306** through **322** of FIG. **3**, applying all the display rules of the relevant windows.
14. The above process is repeated until the user is satisfied with the query he composed or by one of the queries displayed in window **204**.
15. At this stage the user has made his choice of a query (**326** of FIG. **3**B). If his decision is for a query from window **204**, the user will double click that query (step **328**). The selected query is copied to window **202**, replacing the text that was previously there (step **330**). Steps **306** through **322** are repeated by System **100** (step **332**).

    It will be appreciated that the user may edit the query in window **202** even if it was copied there from window **204** or double click another query of window **204**.
16. If the user is satisfied with the query of window **202** and has not found yet the information he is looking for in System Database **108** (as specified by the reference window **226**), window **216** is clicked once (step **334**).
17. System **100** performs then a search for documents in accordance with the query of window **202** and preferences of window **226**. The search is limited to sources specified in windows **238** and **240**, filtering out documents outside of Date Range **230** and documents that have been seen in the past by the current user, as required by window **232** (step **336**).
18. In step **338** the search results are displayed in windows **220** (titles) and **222** (summaries). Summaries of documents that are new to the database may be extracts from the document by a variety of methods such as reading the content of the relevant Meta Tag in an html file type or just reading the first few lines of the document.
19. The user may select a summary and double click it (step **340**).
20. The selected document is displayed in a dedicated window, such as a Netscape browser window (step **342**).

The user may view documents, step back to the search process modifying his search activity in a variety of ways such as composing new queries, editing queries and changing preferences of window **226**.

Following predetermined conditions (such as every 10 minutes or end of search session or every logout) System **100** is processing the new search information and generates new data for System Database **108**. This data is added to the previously stored data for future aided search sessions, as described hereinabove (section of Initial search process).

Simple queries such as of one or two Key Terms are the most intuitive and are frequently the first ones composed in a search session. In another embodiment of the invention, the user may submit such a simple query that in a present art search system will fail to produce useful results and provide many falls results. In the present invention, submission of such a query will actually result in submission of a number of more sophisticated queries, these are Related Queries available from System Database **108**. These queries may be those of a rank above a predetermined threshold. The results will be those that are associated with the highly ranked Related Queries. This method enables valuable results from a simple and intuitive query—not effective by itself.

A method is presented hereinbelow, to associate such simple queries that, in most cases, do not provide the desired results, with more sophisticated queries that are usually not intuitive and are composed only after few interactions with search results and query modifications accordingly.

A search session is defined to be the process of searching information related to a specific subject. A search session includes the composing of queries, submission of queries to a search engine, evaluation of results, modification of queries as a response to such search results, submission of such modified queries—and so on.

Two sessions are different if the subject is different.

In the present embodiment of the invention, semi-automatic session tracing is performed by the system. Queries are identified to belong to the same search session in the following way:

New search session starts by a query (normally after the application is activated). Each new or modified query is compared to all the previous queries. If at least one keyword of this query is used in one of the previous queries of that session—the new query is belongs of the same session.

If the user goes through strategy change in his queries there may be no keyword relation anymore to previous queries even if this is the same search session. For example, a user may search for information on 35 mm film dimensions. He may

start with a query "film and 35 mm" and change strategy to search for standard organizations with the query "iso". To overcome this problem in the present embodiment, when this occurs, the system responds to the user with a question: "Have you started a new search session? Y/N". If the user answers "N" the queries "film and 35 mm" and "iso" are associated with the same search session.

In yet another embodiment of the invention, the data that is collected and processed trough the search sessions is used to generate and support direct information exchange and communication among the members of an organization.

As described hereinabove, during the search session Related Queries and Titles from System Database **108** are associated with the search activity of the user. Since such queries and titles are related also to other users who used them in the past, the names of such users can be presented to the current user for user to user communication.

In the present example, after the user has worked through at least a part of his search session, such a relation to Related Queries and Titles of System Database **108** has been established. The user interface of FIG. **2** may contain "Names" indicator. By clicking this indicator, System **100**, opens a new window. This window contains names, email addresses and phone numbers of the users who used the Related Queries and Titles in the past.

The order of names in the window may by according to the order of Related Queries of window **236** of FIG. **2**. Where two or more names are related to a query the order of presentation of these names would be according to the number of Related Queries with which the names are associated, names associated with more queries to appear first.

The names are adjacent to checkboxes. The user may now, for example, use the checkboxes to select a subgroup of the names and then select an Email option. An email form addressed to the checked names will be opened. The user may then write an email to this group of user, asking for more information about their activity in the subject of his search session.

Of course, the user may also select to use the phone numbers to call these people.

An example that highlights the usefulness of this method is provided hereinbelow: A user may look for an international standard in a specific matter. By looking at the ISO Internet site (www.iso.ch) He may find a reference to the standard he needs but the standard itself is not available there. The standard has to be ordered separately, be paid for and delivered by mail.

In this example the user may place a relevant query in query window **202** in order to get names of people, in the organization, who are involved in that subject. Then he can email them an inquiry to find whether they have in possession the requested document. By doing so he may shorten the time and cost to get the required document.

It would be appreciated by those skilled in the art that efficiency of System **100** depends on the computers in use, communication networks and other device parameters.

The flow of process, as described hereinabove may be modified to suit less efficient devices by avoiding updating the windows of FIG. **2** following any change in any window. Instead, update may be performed as a response to a predetermined partial group of changes or only by an explicit request from the user.

It is also appreciated that non-Boolean query systems, such as Natural Language Queries, may be used in the present invention.

The hereinabove embodiments are described in a way of example and do does not specify a limited the scope of the invention.

The scope of the invention is defined solely by the claims provided hereinbelow:

The invention claimed is:

1. A method for associating documents and queries, comprising:
- receiving a first query submitted by a user;
- retrieving by said first query at least one reference to a document;
- displaying said at least one reference to a document;
- tracing at least one action of said user in relation to said at least one reference to a document;
- storing each of a) said first query as submitted by said user, and b) a relation between said first query and said retrieved at least one reference to a document based on said traced action;
- using at least in part a second query from any user to identify at least one stored query; and
- displaying to said any user said at least one reference to a document based on said relation to said at least one identified query;
- wherein a stored query comprises at least two query terms, and at least one query term comprises an expression containing more than one word.

2. The method of claim **1**, comprising registering said relation to said user.

3. A method according to claim **1**, comprising: determining a ranking of at least one of the following items:
- a) said stored relation between said stored query and at least one stored reference to a document;
- b) said at least one reference to a document;
- c) said first stored query; and
- d) said used second query
- said ranking determination of said at least one of said items being based on at least one of the said traced actions by said user.

4. The method according to claim **3**, comprising registering, to said user, at least one of:
- a) at least one of said user actions; and
- b) at least one of said ranking determinations.

5. A method according to claim **1**, comprising:
- sorting said references to documents according to ranking of stored queries; and
- displaying a list of said references to documents in the said sorting order.

6. A method according to claim **1**, comprising:
- after said storing, receiving a query from any user; receiving a selection from said any user, to display one of:
- a) references to documents displayed in the past to said any user; and
- b) references to documents that were never displayed to said any user.

7. The method according to claim **6**, comprising:
- displaying a first group of references to documents that have been displayed in the past to said user, said documents' rankings being above a pre-determined value.

8. A method according to claim **1**, comprising:
- after receiving said second query from said any user
- storing said second query; and
- associating said identified query containing at least one query term of said second query and said second query as belonging to a same search session.

9. A method according to claim 1, comprising:
after using said second query, receiving a third query;
using said third query to identify at least one stored query containing at least one query term of said third query;
using said at least one identified query to identify at least one search session to which it belongs;
searching said at least one search session for at least one related reference to a document;
retrieving said at least one related reference to document associated with said at least one identified query; and
displaying said at least one related reference to a document.

10. The method according to claim 1, comprising, after storing:
selecting at least one said stored query by a user;
retrieving by said selected stored query at least one reference to a document;
displaying said at least one reference to a document; and
storing said selected stored query, said at least one reference to a document and a relation between said selected stored query and said retrieved at least one reference to a document.

11. The method according to claim 1, comprising receiving a third query from any user and displaying in response to said third query one or more identified stored queries and one or more references to documents having said relations with said displayed queries.

12. The method according to claim 1, comprising, additionally displaying at least one document summary with said one or more references to documents having said relation with said displayed queries.

13. The method according to claim 1, wherein said relation is a computerized data element relating a specific reference to a document to a specific query.

14. The method according to claim 1, wherein said storing a relation comprises a datum that relates a particular reference to a document to a particular query.

15. The method according to claim 1, wherein submitting a query comprises selecting a query from a displayed list of stored queries.

16. A method according to claim 1, additionally comprising:
using a third query from any user to identify at least one stored query containing at least one query term of said third query from said user; and
displaying said at least one stored query.

17. A method according to claim 16, additionally comprising:
displaying one or more of said references to a document, based on stored relations between at least one of said displayed stored queries and said at least one of said stored reference to a document.

18. The method according to claim 1, storing said second query.

19. A method according to claim 1, comprising:
receiving a selection from said user to filter search results based on one of:
a. documents that have been reviewed by said user; and
b. documents that have not been reviewed by said user; and displaying said filtered results.

20. A method according to claim 1, additionally comprising:
the display layout of said at least one displayed identified stored query and at least one displayed stored references to documents is arranged according to said relations between said at least one displayed identified stored query and said one or more displayed stored reference to documents.

21. A method according to claim 1, comprising;
after said displaying, tracing at least one of the following user actions in relation to said at least one reference to a document;
a) said document is reviewed
b) said document is printed;
c) said document is stored in a storage device;
d) said document or a reference to a document thereto is sent, through computerized means; and
e) said reference to a document is selected.

22. The method according to claim 1, wherein said storing a relation comprises receiving an input from a user to create said relation.

23. The method according to claim 1, wherein the method is performed by a server and a database.

24. A method for associating documents and queries, comprising:
receiving a first query submitted by a user;
displaying at least one reference to a document in response to said first query;
tracing at least one action of said user in relation to said at least one reference to a document;
storing each of a) said first query as submitted by said user, and b) a relation between said first query and said at least one displayed reference to a document based on said traced action;
using at least in part a second query from any user to identify at least one previously stored query; and
displaying said at least one identified stored query;
wherein a stored query comprises at least two query terms, and at least one query term comprises an expression containing more than one word.

25. The method of claim 24, comprising registering said relation to said user.

26. A method according to claim 24, comprising determining the ranking of at least one of the following items:
a) said stored relation between said stored query and at least one stored reference to a document;
b) said at least one stored reference to a document;
c) said first stored query; and
d) said used second query; and
said ranking determination of said at least one of said items being based on one of said traced user actions.

27. The method according to claim 26, comprising registering, to said user, at least one of:
a) at least one of said user actions; and
b) at least one of said ranking determinations.

28. The method according to claim 24, wherein said storing a relation comprises receiving an input from a user to create said relation.

29. A method according to claim 24, comprising:
receiving a selection from said user to filter search results based on one of:
a) documents that have been reviewed by said user; and
b) documents that have not been reviewed by said user; and
displaying said filtered results.

30. A method according to claim 24, comprising;
after said displaying, tracing at least one of the following user actions in relation to said at least one reference to a document;
a) said document is reviewed
b) said document is printed;
c) said document is stored in a storage device;
d) said document or a reference to a document thereto is sent, through computerized means; and
e) said reference to a document is selected.

31. A method for associating documents and queries, comprising:

receiving a first query submitted by a user;

retrieving by said first query at least one reference to a document;

displaying said at least one reference to a document;

tracing at least one action of said user in relation to said at least one reference to a document; and

storing each of a) said first query as submitted by said user, and b) a relation between said first query and said retrieved at least one reference to a document based on said traced action;

receiving a second query from any user;

using at least in part said second query to identify at least one stored query; and

displaying to said any user a) said at least one identified stored query and b) one or more references to documents having said relations with said at least one identified stored query;

wherein a stored query comprises at least two query terms, and at least one query term comprises an expression containing more than one word.

32. A method according to claim 31, additionally comprising:

said at least one displayed references to documents being selected using relations stored as a result of tracing at least one action of at least one user included in a group of users.

33. A method according to claim 32, additionally comprising:

the display of said at least one displayed query and said one or more displayed reference to documents is further modified according to a selection by any user of at least one of said at least one displayed query.

34. A method according to claim 31, wherein said at least one of said displayed queries is selected from queries submitted by at least one user included in a group of users.

35. A method according to claim 31, additionally comprising:

the display layout of said at least one displayed query and at least one displayed references to documents is arranged according to said relations between said at least one displayed query and said one or more displayed reference to documents.

36. A method according to claim 31, additionally comprising:

after said display of stored queries, receiving one of said displayed queries for a successive document search.

37. The method according to claim 31, storing said second query.

38. A method according to claim 31, comprising:

receiving a selection from said user to filter search results based on one of:

a) documents that have been reviewed by said user; and

b) documents that have not been reviewed by said user; and

displaying said filtered results.

* * * * *